

WHAT IS CLAIMED IS:

1. An optical signal processor comprising:

optical input/output means including a plurality of input/output ports for inputting or outputting light; the plurality of input/output ports having respective light input/output directions, in parallel with each other, located on a first virtual plane; the optical input/output means inputting light into any of the plurality of input/output ports and outputting the light from any of the other input/output ports;

a first optical system for collimating the light arriving from any of the plurality of input/output ports, and outputting thus collimated light;

wavelength branching means for receiving the light collimated by the first optical system, spatially separating the light in terms of wavelength, and outputting thus obtained wavelength light components, thus outputted wavelength light components having respective optical axes located on a second virtual plane;

a second optical system for receiving the wavelength light components outputted from the wavelength branching means after wavelength separation, and converging the wavelength light components; and

reflecting means including a mirror with a reflecting surface positioned at a light-converging point of the wavelength light components converged by the second optical

system; the reflecting means causing the light reflected by the mirror to be outputted from any of the plurality of input/output ports by way of the second optical system, wavelength branching means, and first optical system;

5            wherein the first and second virtual planes are not parallel to each other; and

             wherein the light fed into the wavelength branching means after being collimated by the first optical system has a greater beamwidth in a direction parallel to the second virtual plane than in a direction perpendicular to the second  
10            virtual plane.

             2.     An optical signal processor according to claim 1, wherein the wavelength branching means includes a diffraction grating device.

15            3.     An optical signal processor according to claim 1, wherein the first and second virtual planes are perpendicular to each other.

             4.     An optical signal processor according to claim 3, wherein a line connecting a point where an optical axis of light fed from the first optical system into the wavelength  
20            branching means intersects the wavelength branching means and a point where an optical axis of light fed from the second optical system into the wavelength branching means intersects the wavelength branching means is perpendicular  
25            to the second virtual plane.

             5.     An optical signal processor according to claim

4, wherein any two mirrors included in the reflecting means have respective inclination angles of reflecting surfaces different from each other about a line, parallel to the second virtual plane and perpendicular to an optical axis of the second optical system, passing the light-converging point.

6. An optical signal processor according to claim 4, wherein each mirror included in the reflecting means has a reflecting surface with an inclination angle variable about a line, parallel to the second virtual plane and perpendicular to an optical axis of the second optical system, passing the light-converging point.

7. An optical signal processor according to claim 3, further comprising:

polarization separating means disposed between the input/output means and the wavelength branching means; the polarization separating means separating the light fed into any of the plurality of input/output ports into respective polarized light components having first and second directions orthogonal to each other in terms of polarization, and outputting a first light beam of the polarized light component having the first direction and a second light beam of the polarized light component having the second direction; and

polarization plane rotating means disposed between the polarization separating means and the wavelength branching means; the polarization plane rotating means

receiving any of the first and second light beams outputted from the polarization separating means, rotating a polarization direction of the received light beam to make the first and second light beams have the same polarization direction yielding the highest wavelength branching efficiency in the wavelength branching means, and outputting thus rotated light beam;

wherein a line connecting a point where an optical axis of the first light beam fed from the first optical system into the wavelength branching means intersects the wavelength branching means and a point where an optical axis of the second light beam fed from the first optical system into the wavelength branching means intersects the wavelength branching means is parallel to the second virtual plane; and

wherein a line connecting a point where an optical axis of the first light beam fed from the first optical system into the wavelength branching means intersects the wavelength branching means and a point where an optical axis of the second light beam fed from the second optical system into the wavelength branching means intersects the wavelength branching means is perpendicular to the second virtual plane.

8. An optical signal processor according to claim 1, wherein mirrors included in the reflecting means have respective reflecting surfaces with the same inclination

angle about a line, perpendicular to the second virtual plane,  
passing the light-converging point.

9. An optical signal processor according to claim  
1, wherein each mirror included in the reflecting means has  
5 a reflecting surface with an inclination angle variable in  
N stages, whereas the optical input/output means includes  
N+1 input/output ports (N being an integer of 2 or greater).

10. An optical signal processor according to claim  
1, wherein each mirror included in the reflecting means has  
10 a reflecting surface with an inclination angle variable in  
N stages, whereas the optical input/output means includes  
2N input/output ports (N being an integer of 2 or greater).

11. An optical signal processor according to claim  
10, wherein the optical input/output means comprises a common  
15 input port, a common output port, an n-th channel input port,  
and an n-th channel output port as the 2N input/output ports;  
the n-th channel input port and n-th channel output port  
inputting or outputting signal light in the same channel;  
and

20 wherein the number of input/output ports located  
between the common input port and the n-th channel input  
port is identical to the number of input/output ports located  
between the common output port and the n-th channel output  
port, where  $n = 1$  to  $N-1$ .

25 12. An optical signal processor according to claim  
11, wherein the common input port and the common output port

are adjacent to each other; and wherein the n-th channel input port and the n-th channel output port are adjacent to each other.

5           13.   An optical signal processor according to claim 1, wherein a line of intersection between the reflecting surface of each mirror included in the reflecting means and a plane, parallel to the second virtual plane, including the light-converging point, is a curve in an area including a center position of the light-converging point.

10           14.   An optical signal processor according to claim 13, wherein the curve has a variable curvature.